

NASA TECH BRIEF



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Polytetrafluoroethylene Lubricates Ball Bearings in Vacuum Environment

The problem:

To devise a dry lubricant for steel ball bearings to be used in a high-vacuum environment. Commonly used dry lubricants, including molybdenum disulfide, were found to be unsatisfactory for ball bearings operating in a high vacuum.

The solution:

Uniformly intersperse a small number of PTFE (polytetrafluoroethylene) balls among the load-bearing steel balls.

How it's done:

In a typical assembly of 30, 0.25-inch-diameter stainless steel balls, every fifth ball is replaced with a ball made of PTFE. Normal abrasion of the surfaces of the PTFE balls during operation of the bearing provides a thin (microinch) film that is an effective lubricant at temperatures ranging from 80° to -250°F. Since the amount of material worn off from the PTFE is slight, the operating life of the ball assemblies may reach thousands of hours.

Notes:

1. If the ball assemblies are to operate under heavy load, fiberglass strands or powdered metals may be incorporated in the PTFE balls to give them greater strength.

2. An alternative is to use a reinforced PTFE or polyimide polymer retainer for the steel balls. The steel balls will be lubricated by the film worn off from the retainer wall.
3. Further information concerning NASA developments on solid lubricants is given in NASA SP-5014, "NASA Contributions to the Technology of Inorganic Coatings," 1964, available from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia, 22151. Inquiries may also be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama, 35812
Reference: B66-10081

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C., 20546.

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